Shropshire Botanical Society

Newsletter

Autumn 2017

Shropshire Botanical Society Newsletter No. 35

Contacts

Newsletter Commissioning Editor:
Hilary Wallace.
email: hilary@ecologicalsurveys.co.uk

Secretary: Penny Wysome, 2 Christine Ave., Wellington, Telford, TF1 2DX. Tel. 01952 242617, email: pennywysome@yahoo.com

Membership Secretary: Peta Sams, 14 Ballard Close, Ludlow SY8 1XH.
Enquiries to: shropbotsoc@gmail.com

Vice-county Recorder: Sarah Whild, 9 Albert Street, Shrewsbury, SY1 2HT.
Email: S.Whild@mmu.ac.uk

Past copies of the newsletter are available as pdfs from the Shropshire Botanical Society website: : http://www.shropshireecology.co.uk/botanical_society.html

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Front Cover:

Nuphar pumila Least Water-lily at Colemere
(photo by Dan Wrench)

Our thanks to the Shropshire Wildlife Trust and the Field Studies Council for their generous support of our society. Both organisations support the work of the society in recognition of the importance of the contribution we make to understanding Shropshire botany.

Society News

Hilary Wallace

With summer now well behind us, if there was a summer after June, this autumn newsletter has a rather reflective tone with historical articles on Moss balls, Least Water Lily on the Meres, and the musings of an Old Country Woman, identity unknown. The watery theme continues with an article on recent research on the conservation of *Nuphar pumila* – which you will hopefully find an interesting taster to the Christmas meeting when Richard Lansdown from IUCN will be presenting the most up to date results of this work. Finally there are articles on ash die back and stomata and the usual update on new finds in the county

There have been some changes at the society since the last newsletter. After 7 years of cajoling and encouraging folk to write interesting articles for the newsletter and then skilfully collating them, Mags has decided to have a break. I am sure we would all like to thank her for all her hard work. Hilary has taken over this role whilst Gordon will continue to do his magic with the layout and design of the newsletter, for which we are most grateful.

It is with sadness that we note the passing of Dorothy Young, an active member in the Clun area, and pass on our condolences to Maurice and their family.

Society Indoor Meetings

Winter meeting

Saturday 9 December 2017, 2–4 pm at Preston Montford Field Centre, Montford Bridge, Shrewsbury SY4 1DX.

Richard Lansdown: Chair of the IUCN SSC freshwater plant specialist group will talk about "Conserving the Least Water-Lily at Cole Mere."

There will be the usual book sale – so please bring along any previously loved books that you no longer have space for on your bookshelves. They will be sold in aid of society funds.

Finally the **Cake Challenge**.

You rose to the challenge magnificently last year. So can you please do it again? Offers to bring cake/ biscuits gratefully received by Penny – especially if they have a botanical ingredient.
Contact: pennywysome@yahoo.com

Spring Meeting and AGM

Saturday 14 April 2018, 2–4 pm

Dr Natasha DeVere from the National Botanic Gardens of Wales, will be talking about her work on DNA barcoding of our flora.

Meetings will be held at our usual venue at Preston Montford Field Studies Centre, Montford Bridge, Shrewsbury, SY4 1DX.

Field meeting dates and venues for 2018 will be issued in the spring 2018 newsletter.

Can you help?

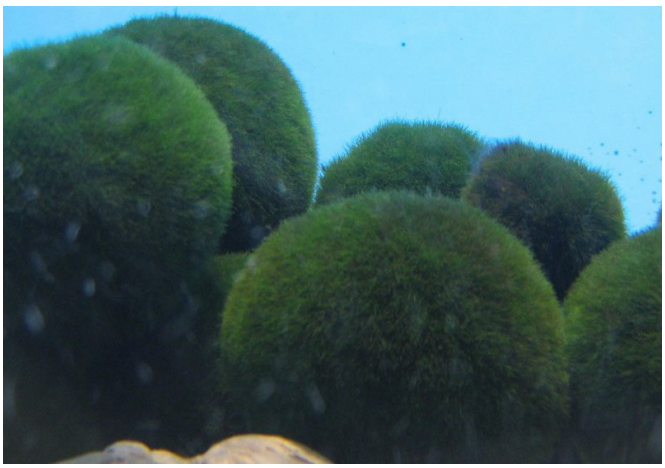
Each year we attend many events in the local area and wondered if any of you would be interested in promoting the work of the society by going along with our display boards and just chatting to people about what we do.

A list of dates and venues will be included in the spring newsletter, but this is a chance for you to think about getting involved in a practical way.

Moss Balls in the North Shropshire Meres

Kirsty Brown

Whilst looking into the history of The Meres in North Shropshire, information was uncovered about the presence of a curious phenomenon known as Moss Balls, in both of the meres at Colemere and Ellesmere. Aquatic moss balls are beautiful and appealing in their appearance as soft,



rich green-coloured spheres. Records of sightings found so far at these locations have been in historic texts written between 1879 and 1895, and are summarised below.

The Shropshire Word Book (Jackson, 1879) mentions that Moss Balls are sometimes called Mere-Balls, and shares this description by Mr. G. Christopher: 'Peculiar to this mere [Colemere], and I think to no other sheet of water in England, are the green moss-balls (*Conferva aegagropila*[1]), and brown moss balls composed of fir leaves. It is supposed that the bottom of the mere is troubled with conflicting eddies and currents, caused no doubt by springs, and that these currents catch up the fir leaves that fall from the trees on the south side of the mere, and roll them up, together with particles of *confervae*, into balls of different sizes, even up to two feet in diameter. The moss-balls are composed entirely of *confervae*. The currents convey these balls to the opposite side of the mere (where the reeds are), and there they may be found in thousands at a depth of three or four feet. The cohesion of each ball is perfect' (Davies, 1873).

Kelly's Directory of Shropshire (1895) also mentions Colemere moss balls: 'Ellesmere is much frequented during the summer months, its lakes and scenery making it a favourite spot for picnics, excursions and fishing parties. Excellent pike and other fish abound in the meres, which are six in number and form a peculiar and attractive feature in the neighbourhood, and present a good field for the botanist; as many as fifteen or sixteen different species of ferns are to be met with here, and in one of the meres (that at Colemere, 2 ½ miles distant) moss balls ("con-fervae") are also found.'

A third mention of Colemere Mere's moss balls tells us that there is a kind known locally as 'hedgehogs' consisting of larch leaves, grass etc. held together with algae, varying in size from that of an apple to that of a man's head, that wash ashore and can be easily broken apart (Phillips, 1984). Interestingly, Phillips notes that these are different to the 'Moss Balls' or 'Moor Balls' found in both Colemere Mere and Whitemere Mere, which are green, soft, spongy, the size of an apple, and known to naturalists as *Cladophora aegagropila*, also an algae. A more recent account of the North Shropshire Meres and Mosses by C. A. Sinker in 1962 links these moss-balls described by Phillips and the *Cladophora sauteri* balls at Malham Tarn, referred to by Holmes (1956) and Lund (1961), as possibly being identical.

The is a description of a moss ball from Ellesmere, by Rev. W. Houghton, in his book 'Country Walks of a Naturalist with His Children': 'Here in this same stream are the long green threads

1 *Conferva aegagropila* is an algae now known as *Aegagropila linnaei* (Kützing, 1843).

of *Cladophora glomerata*… Do you remember a round green ball about the size of a small apple which I have at home? Well, that ball, which came from Ellesmere, is nothing else than a mass of this same *Cladophora*. Dr. Hassall is no doubt correct in his explanation of the formation of these balls. He says, "This state of *Cladophora glomerata* I believe to be formed as follows: A specimen by the force of some mountain stream swollen by recent rains becomes forced from its attachment; as it is carried along by the current, it is made to revolve repeatedly upon itself, until at last a compact ball is formed of it, which finally becomes deposited in some basin or reservoir in which the stream loses itself, and in which these balls are usually found." Here are some specimens in the water of a rich brown colour instead of green. This is caused by the growth of other algae over its long branches. See! I shake a bit in my bottle, and you see a quantity of brown deposit comes off, showing the green threads of the Cladophora underneath' (Houghton, 1870).

Moss balls of different kinds are found around the world, including the lake balls made up of *Aegagropila linnaei*, found in Iceland. Whilst *A. linnaei* is widely found in the Northern Hemisphere, it is rare to find the beautiful, soft green spherical form. As the ecosystem deteriorates due to increased pollution and sedimentation, the local people are finding fewer and fewer of the lake balls, to the point where they are no longer found in Lake Mývatn (**Ólafsdóttir**, J., 2014). Often called marimo balls by aquarium enthusiasts, aquatic moss balls can readily be obtained from aquatic specialist shops and via the internet, and are apparently easy to maintain in fish tanks.

Records of moss balls in Colemere and Ellesmere have been found in historic texts between 1879 and 1895 so far. Further investigation of sightings outside of these dates, along with uncovering the exact nature of these local moss balls, and the causation behind their formation and absence over time in these meres, would prove an interesting project to pursue. No anecdotal or physical evidence of moss balls in The Meres of North Shropshire has been forthcoming in recent times, but perhaps this article will inspire a resurgence of interest. Any information and photos would be gratefully received.

With thanks to Chris Hickman and Mags Cousins for their interest and input into discovering more about this mysterious phenomenon!

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Kirsty Brown, Community Officer, Meres and Mosses Landscape Partnership Scheme and Nature Improvement Area

c/o Shropshire Wildlife Trust, 193 Abbey Foregate, Shrewsbury, SY2 6AH

Website: www.themeresandmosses.co.uk

Facebook: https://www.facebook.com/Meres-and-Mosses-Landscape-Partnership-Scheme-and-Nature-Improvement-Area-249099225213375

Twitter: https://twitter.com/MeresandMosses

Email: kirstyb@ShropshireWildlifeTrust.org.uk

Obituary - Dorothy Young 1930–2017

Mary Eminson

Maurice and Dorothy Young were members of Shropshire Wildlife Trust (SWT) from about 1984 when they moved to Telford (where Maurice was a vicar - he had previously been in the Army). In Telford Dorothy had developed her interest in botany, especially in wildflowers and she did quite a lot of training with Sarah Whild. Dorothy did a lot of botanical surveys, mainly flowers but all kinds of wildlife, and she was active in plotting observations in a number of places including Rhos Fiddle before it became a SWT reserve.

In 1994 Maurice and Dorothy moved to Clun and Dorothy became active in the SWT branch here, which had previously been run in a fairly informal way. She was instrumental in the move to adopt a constitution and have identified roles for committee members and she helped to expand and develop the programme of the branch in the 90s when it really was VERY active with talks, walks, activities for young people as well as volunteering in the reserves and in surveys along the Clun and elsewhere. She took over as Secretary in about 1997, and organised the programme until 2004 when she handed over to Alison Weeks. Dorothy remained an active branch member until very recently and always made clear and trenchant contributions to the discussion - she was very helpful to me when I took over as Programme Secretary in 2014 and was refreshingly frank in helping me find my feet, just what I needed.

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Conserving England's only population of *Nuphar pumila*, Least Water-Lily

Mags Cousins

In early 2016 Natural England developed a project with the Royal Botanic Gardens (RBG) Kew, Richard Lansdown (Chair IUCN SSC Freshwater Plant Specialist Group), and the Shropshire Botanical Society to review of the status and condition of the *Nuphar pumila* population at Cole Mere SSSI, Shropshire with a view to improving the in-situ conservation management of the species and establishing further colonies either at Cole Mere or elsewhere. The species is considered to be at risk of extinction in England by 2020 and is on the England Red List as Critically Endangered, as Cole Mere is the only remaining site for it in England. The next nearest populations are in Scotland. In Great Britain as a whole it is considered 'Least Concern' as the Scottish populations appear pretty stable.

Richard Lansdown will be giving a talk at the Shropshire Botanical Society winter meeting (9th Dec.) on the full findings of the project, but meanwhile here is a brief synopsis:

Aims and objectives

1. Summarise the known ecology of *Nuphar pumila*, status and provide management and monitoring recommendations at Cole Mere (Ardeola Environmental Services)
2. Test seed viability and develop seed and rhizome propagation protocols (Royal Botanic Gardens, Kew) and keep any new plants resulting from the trials in the collection at Kew for public display
3. DNA analysis of *N. pumila* from Scottish and Cole Mere populations to detect degree of similarity and to determine if there has been hybridisation with *N. lutea* at Cole Mere (Royal Botanic Gardens, Kew)

Ecology and habitat management

The autecology study confirmed that several factors were probably contributing to suppressing *N. pumila* at Cole Mere:

- Direct shading by trees
- Accumulation of leaf litter and silt covering the rhizomes, submerged leaves and seed
- Turbidity of water due to algae and suspended sediment reducing photosynthesis by submerged leaves and affecting germination
- Budding from rhizomes is likely to be the main natural method of increase at Cole Mere. But floating rhizomes once uprooted, are unable to re-root successfully once detached from the parent plant so it is detrimental to the population that rhizomes are uprooted each year, probably by waterfowl

The conclusion was that the effects of shading and the direct impact of smothering of rhizomes by leaf litter was likely to be the most significant factor in suppressing *N. pumila*, rather than water quality per se and that further tree felling on the mere edges would be beneficial. This has already been carried out near to the existing colony.

It is a rhizomatous perennial and there are signs at Cole Mere that waterfowl, probably in particular Mute Swans with their long reach, are feeding on the submerged lettuce-like leaves and uprooting large numbers of the rhizomes (see Fig. 1). Some of these were collected and Kew attempted to propagate them in aquatic baskets in controlled

Fig. 1 Uprooted rhizomes at Cole Mere SSSI (photo S.Miles)

Fig. 2 Rhizome in aquatic basket (photo J.Peach)

conditions (see Fig.2). Those without buds rotted, but those that already had shoots are still growing in Kew's nursery and hopefully will form the basis of a collection for public display and education at Kew. With the help of the local friends group the intention is to try collecting the uprooted rhizomes and re-sinking them directly back into Cole Mere this autumn.

Seed viability

Prior to this project it was not known if the *N. pumila* at Cole Mere was producing viable seed, so several capsules were collected and tested in the laboratory by the RBG Kew's Millennium Seed Bank team. A tetrazolium chloride test, which stains living tissue red (see Fig. 3), found that 92% of the collected seeds were viable. To stimulate germination, the seeds were first subjected to a cold period to mimic winter, then low oxygen conditions to mimic being at the bottom of the lake bed. Successful germination depended on very specific conditions, especially light levels, with a period of low light proving to be significant. It was very labour intensive with only 10 live seedlings from the 100's of 'viable' seed collected (see Fig. 4). Rhizome

Fig. 3 Seed showing live tissue stained red in tetrazolium test (photo J.Peach)

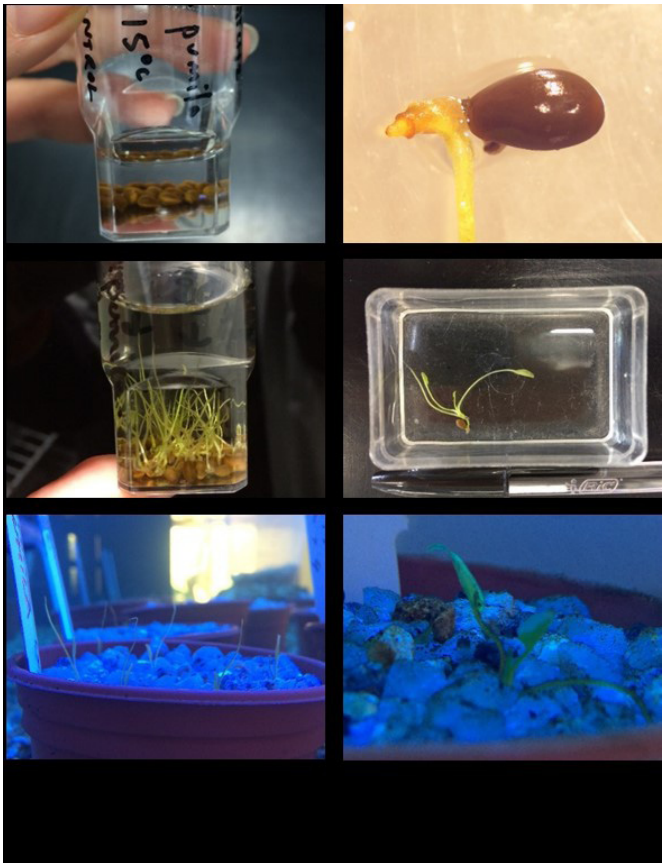

Fig. 4 Stages in seed germination (Photo J.Peach)

propogation is looking like the most effective way of propagating new plants.

Genetics

Nuphar pumila can hybridise with *N. lutea* Yellow Water-lily which is also present at Cole Mere. One of the features that distinguishes between the two species is the shape of the stigmatic disk, which in *N. pumila* is distinctly lobed at the margin, whereas in *N. lutea* it is circular or slightly crenate at the margin (Stace, 2010) (see Fig. 5). Hybrids may be intermediate between these two forms (Arrigo, 2016) and if hybridisation was occurring at Cole Mere this could have had implications for the conservation of the species. The genetic analysis of plant tissue from Cole Mere and Scottish populations showed that the Cole Mere population did not differ that much from Scottish populations and that it had not hybridised with the common Yellow Water-lily at Cole Mere (see Fig. 6).

Monitoring protocol

Anecdotal evidence indicates that the remaining patches of *N. pumila* may have increased at Cole Mere over the last 5 years in response to the removal of shading shoreline trees but it is hard

Fig. 5 Lobed stigmatic disk of *Nuphar pumila* (left) compared with *N. lutea* (right) (photos D.Wrench)

to measure and is leaf cover actually an accurate representation of rhizome abundance? The project has developed a more robust means of monitoring the abundance/cover of the plant by enlisting the help of local divers from Inner Space dive club (Fig. 7) who can trace petioles from leaves on the surface, to rhizomes on the lake bed. This will enable correlation to be made between surface leaf cover and rhizome extent but is rather dependent on visibility of the water which at Cole Mere is notoriously fickle as algal blooms can occur with great rapidity.

Acknowledgements

The project was primarily supported by the Natural England Species Recovery Programme, the Innovation Fund and the Lakes Restoration programme and also the Community Grant of the Meres and Mosses project and Corporate Sponsors NIBS Ltd and Sulphate Solutions. Thanks to all involved especially the site owners and managers, Shropshire Council, also key researchers Richard Lansdown (Ardeola Environmental Services), Jenny Peach, Stephanie Miles, Ted Chapman (RBG Kew) and Mike Fay for genetic analysis (RBG Kew).

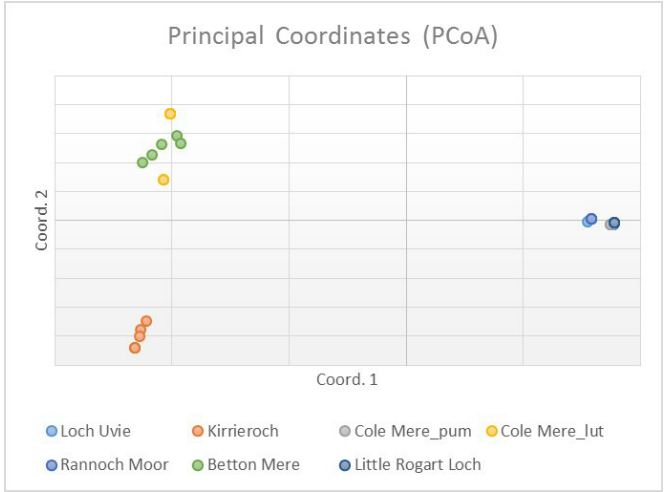

Fig. 6 Genetic analysis of *Nuphar pumila* (M.Fay)

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Fig. 7 Inner Space Dive Club searching for rhizomes (photo D.Wrench)

Thomas Cox's Magna Britannia 1720-31

Alex Lockton

I like it when a new source of botanical records becomes available to us, particularly when it is a document we knew about second hand. So it is good to find the Shropshire part of Cox's *Magna Brittania*, also published as *A Topographical, Ecclesiastical and Natural History of Shropshire*, digitized by Google and the University of California. Here are the relevant sections in full.

Rare Plants growing wild in this County.

Gramen Junciodes lanatum; Hare's Tail-Rush, which grows near *Ellesmere* in the *Meers*, in great Abundance; 'tis the same with *Gramen plumosum Elegans*, &c.

Persicaria Siliquosa; Codded Arsemart, or, Touch-me-not, which grows on the Banks of the River *Kemlet* at *Marington*, in the Parish of *Cherbury*; as also at *Guerndee*, in the Parish of *Cherstock*, about half a Mile from the said River, among great Alder-trees in the Highway.

Rosmarinum Silvestre minus; The lesser wild Rosemary, which grows in the Moors at *Birch*, in the Parish of *Ellesmere*, plentifully, and in other Counties in boggy Places.

Cynocrambe, or *Mercurialis perennis Repens*; Dog-Mercury branched and seeded like Spinage or Mercury. We have a strange Effect of this Herb set down in the Philosophical Transactions. The Wife of one *Matthews*, who dwelt near *Shrewsbury*, gathered some Herbs, and having boiled them, fryed them with Bacon, for her own and Family's Supper, and eat them with great Pleasure; but in the Night following, about two Hours after they had been in Bed, their Children, which were three in Number, fell very sick, vomited and purged, and then fell asleep, and could not be waked for 24 Hours. Two of them then vomited, and it saved their Lives; the third slept on, and only opened its Eyes, and died. The Man and Woman slept longer than usual, but waking, were troubled, the one with such a burning in his Chin, as forced him to dip it often in Water; and the other continued sick a pretty while before she recovered; but at length grew well.

A Student in Physick having sent us an Addition of rare Plants found in this County, we take our selves obliged to subjoin them.

Lycopodium; Club-masse, found on *Stiperstone-Hills*.

Asplenium; Spleenwort, on the Walls at *Ludlow*.

Alchymilla; Lady's Mantle, near *Bishops-Castle*.

Hieracium Montanum Cichorei folio nostras; Succory leaved Mountain Hawkweed; somewhere in this County.

Helenium Elecampane; about *Church-Stoke*.

Virga aurea; Golden Rod, in the Woods near *Bishops-Castle*.

Baccharis; Ploughman's Spikenard, in the Road between *Onebury* and *Ludlow*.

Paludapium; Smallage, in *Stank-mead* near *Bishops-Castle*.

Cannabis Spuria flore eleganti; Fair flowered Nettle Hemp, very common among the Corn, in the South-West Parts.

Verbascum nigrum; Sage leaved Black-mullen, in the Road between the *Heath* and the *Fay*.

Pinquicula; Butter-wort, near *Longment*.

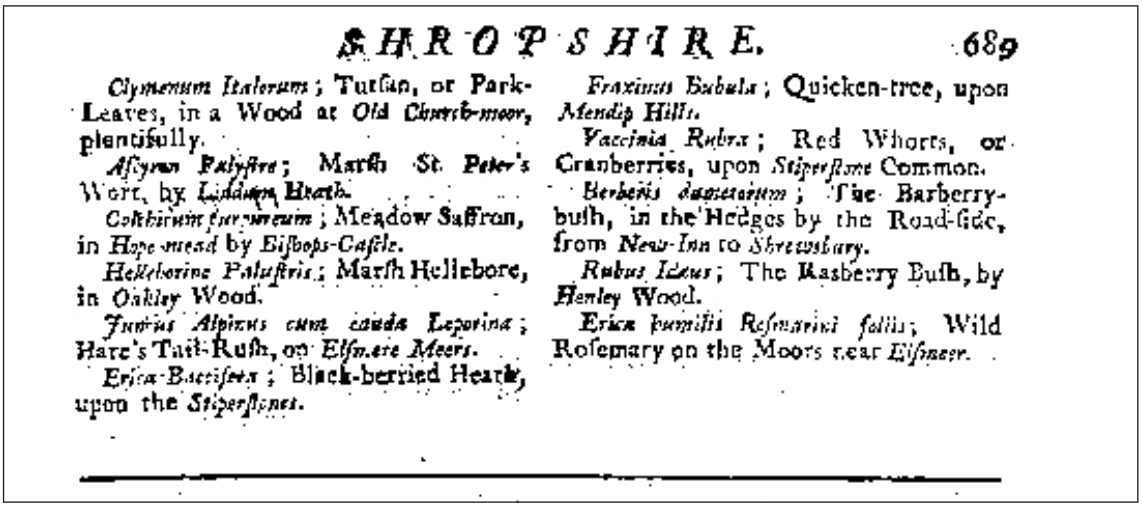
Eruca Silvestris; Wild Rocket on the Walls of *Ludlow* Castle.

Persicaria siliquosa; Quick-in-Hand, at *Guern-Dee*.

Fumaria claviculata; Climbing Fumitory, in the Warren near *Bishops-Castle*, plentifully.

Caryophillus minor repens nostras; Maiden-pinks, in the Lane from *Bishops-Castle* to *Woodbeach*.

Clymenum



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Clymenum Italorum; Tutsan, or Park-Leaves, in a Wood at *Old Church-moor*, plentifully.

Aſcyron Paluſtre; Marſh St. *Peter's* Wort, by *Liddam* Heath.

Colchicum ſativum; Meadow Saffron, in *Hope-mead* by *Biſhops-Caſtle*.

Helleborine Paluſtris; Marſh Hellebore, in *Oakley* Wood.

Juncus Alpinus cum cauda Leporina; Hare's Tail-Rush, on *Elſmere Meers*.

Erica Baccifera; Black-berried Heath, upon the *Stiperſtones*.

Fraxinus Bubula; Quicken-tree, upon *Mendip Hills*.

Vaccinia Rubra; Red Whorts, or Cranberries, upon *Stiperſtone* Common.

Berberis damaſcenum; The Barberry-buſh, in the Hedges by the Road-ſide, from *New-Inn* to *Shrewsbury*.

Rubus Idæus; The Rasberry Buſh, by *Henley* Wood.

Erica humilis Roſmarini folio; Wild Roſemary on the Moors near *Elſmere*.

This document shows that the 'student in physick' was in fact Littleton Brown (1699-1749) of Bishops Castle, who corresponded with Johann Dillen at Oxford in the 1720s. The date for the records can therefore be put fairly accurately at 1726 or a year or two earlier. Here are our interpretations of them, with modern species and site names and suggested grid references. In some cases we have additional information from other sources – for example we know the *Asplenium* in Ludlow was in Frog Lane, whereas the *Diplotaxis* was on the castle walls. People might also like to take care not to feed Dog's-mercury to their children.

Littleton Brown's records from *Magna Britannia*, ca. 1726

Diphasiastrum alpinum	Alpine Clubmoss	The Stiperstones	SO3698
Asplenium ceterach	Rustyback	Ludlow	SO5074
Alchemilla filicaulis	Lady's-mantle	Bishops Castle	SO3288
Hieracium sp.	Hawkweed	Shropshire	
Inula helenium	Elecampane	(Montgomeryshire)	
Solidago virgaurea	Goldenrod	The Dingle, Colebatch	SO3086
Inula conyzae	Ploughman's-spikenard	Onibury	SO4777
Apium graveolens	Wild Celery	Stank Meadow	SO3387
Galeopsis speciosa	Large-flowered Hemp-nettle	Bishops Castle	SO3288
Verbascum nigrum	Dark Mullein	Heath House	SO3876
Pinguicula vulgaris	Common Butterwort	The Long Mynd	SO4494
Diplotaxis tenuifolia	Perennial Wall-rocket	Ludlow Castle	SO5074
Impatiens noli-tangere	Touch-me-not Balsam	(Montgomeryshire)	
Ceratocapnos claviculata	Climbing Corydalis	Bishop's Castle	SO3288
Dianthus deltoides	Maiden Pink	Bishop's Castle	SO3288
Hypericum androsaemum	Tutsan	Churchmoor	SO4188
Hypericum elodes	Marsh St John's-wort	Lydham Heath	SO3490
Colchicum autumnale	Meadow Saffron	Hope Mead	SO3288
Epipactis palustris	Marsh Helleborine	Oakeley Wood	SO3488
Eriophorum vaginatum	Hare's-tail Cottongrass	The Mere, Ellesmere	SO4034
Empetrum nigrum	Crowberry	The Stiperstones	SO3698
Sorbus aucuparia	Mountain Ash	(Somerset)	
Vaccinium myrtillus	Bilberry	The Stiperstones	SO3698
Berberis vulgaris	Barberry	New Inn, Ludlow	SO5175
Rubus idaeus	Raspberry	Henley Wood	SO2987
Andromeda polifolia	Bog-rosemary	The Mere, Ellesmere	SO4034

Update on Ash Dieback (Chalara), *Hymenoscyphus fraxineus* in Shropshire

It was five years ago in 2012, that Ash *Fraxinus excelsior* trees were first found in Britain showing unusual disease symptoms; at a nursery in Buckinghamshire in a consignment of trees from the Netherlands and in woodland in Norfolk and Suffolk. DNA sequencing confirmed that the trees were infected with a pathogen now known as the fungus *Hymenoscyphus fraxineus*. Confusingly the organism acquired two earlier names *Chalara fraxinea* (for the asexual form seen causing the infection in the trees) and *Hymenoscyphus pseudoalbidus* (the sexual or reproductive form seen on the stalks of fallen leaves). Thankfully one name *H. fraxineus* now covers both forms but 'Chalara' is still used as the common name for the disease it causes.

There was good reason to be worried as this fungal pathogen was first discovered in Poland in 1992 where it has been causing huge losses in Ash trees. It has been spreading across Europe ever since and it is now spreading across the UK, including Shropshire. There are more 'records' in central and southern Shropshire than in the north, but I wonder that I have not seen it myself in Shropshire as it now appears to be quite widespread, according to the Forestry Commission incidence map, see Fig 1.

The symptoms are very characteristic and there is an excellent photographic guide on the FC website: http://www.forestry.gov.uk/forestry/INFD-92AHUK that accompanies the following descriptions:

- Dead or dying tops of trees, most easily seen throughout summer
- Wilting leaves, most visible in spring and early summer
- Lesions and cankers on stems/branches/shoot, visible throughout the year (described elsewhere as elongated diamond shaped)
- Dieback of leaves with brown/black leaf stalks, most easily seen throughout summer
- Fruiting bodies on fallen blacked leaf stalks, visible June to October
- Staining of wood under bark lesions, visible throughout the year

In order to understand the pathogenicity of *H.*

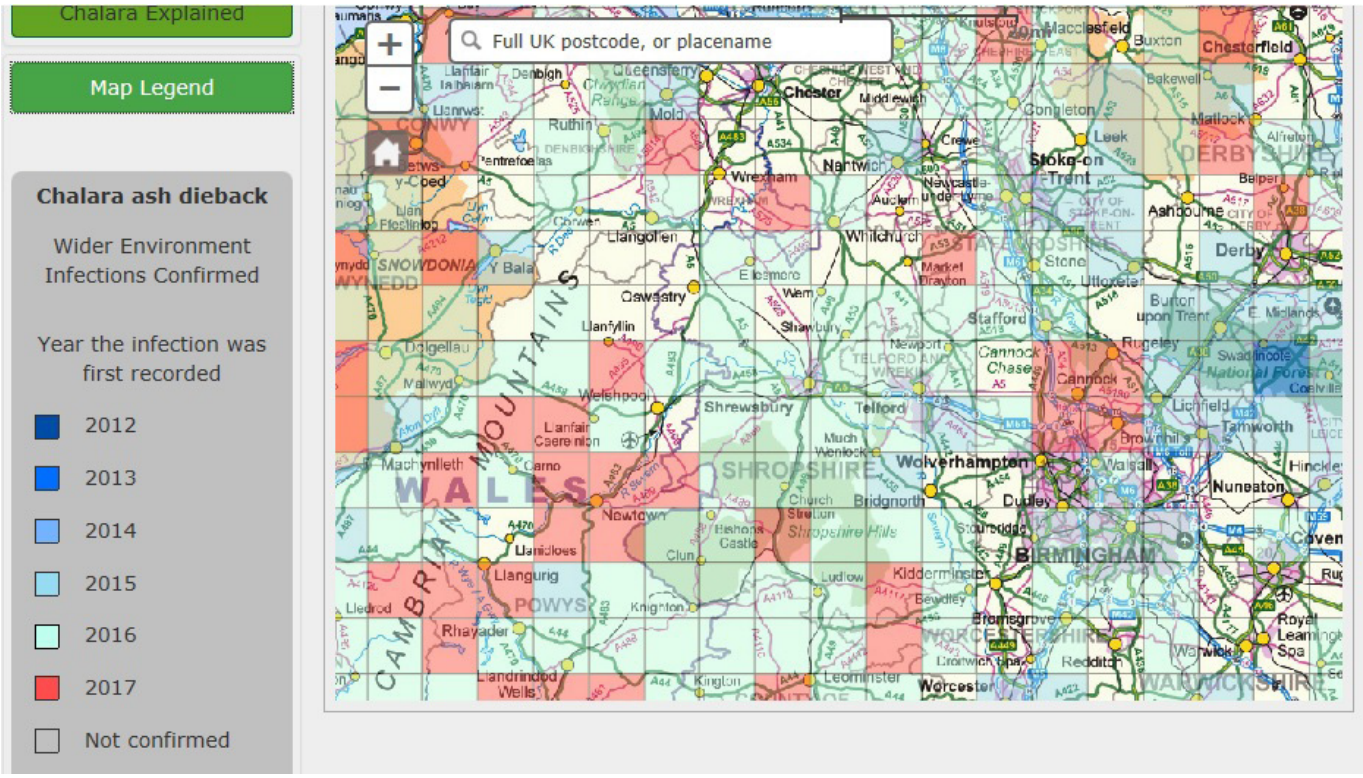

Fig.1 Clip from Forestry Commission Chalara Interactive Map http://chalaramap.fera.defra.gov.uk/

fraxineus, it has been genome sequenced and compared with other species of *Hymenoscyphus*. The research suggests that *H. fraxineus* coexists with many other species of fungi, and may be present for a few months before disease symptoms are identifiable, also that other fungi may exploit the tissues weakened by *H. fraxineus* (Nornex, 2016). The *H. fraxineus* fungus causes leaf loss, crown dieback and bark lesions and once a tree is infected, over a period of years the disease is usually fatal, either directly, or indirectly by weakening the tree to the point where it succumbs more readily to attacks by other pests or pathogens, especially by *Armillaria* fungi, or honey fungus.

H. fraxineus is transmitted by wind-borne spores that colonise healthy leaves in the summer months, before advancing along the petiole into the branches of the tree. The fungus remains in the rachises after the leaves have dropped, continuing to grow on Ash debris and in the soil. Small white fruit bodies are produced on the mummified rachises which release spores the following summer, initiating a new infection cycle. However trees need to suffer a high dose of spores in order to become infected. The fungus produces asexual and sexual spores at different stages in its life cycle and research has shown that both can be infective. It is also possible that it infects trees via the roots (Fones, 2016).

The search for tolerant Ash trees has included searching for genetic markers for tolerance and comparing the genomes of Ash trees from different regions. Genome assemblies have been produced from trees with low disease susceptibility and genetic markers have been found that strongly predict inheritance of disease tolerance both in Danish and UK Ash trees (Nornex, 2016). Propagation from these trees could help rebuild a population of Ash less susceptible to the disease.

Unfortunately there could be bit of a catch as selecting *Fraxinus excelsior* genotypes that are tolerant to *H. fraxineus* for re-establishment of Ash forests, may be simultaneously selecting genotypes with a greater susceptibility to the destructive Emerald Ash Borer (EAB). This is because the most tolerant Ash genotypes to Chalara have low levels of several glycosides of a type that are involved with plant–herbivore interactions and defending the tree against insects. EAB has devastated *Fraxinus pensylvannica* forests in the United States and has now been reported in Russia but is not yet found in the UK. It remains to be determined if the trees showing tolerance to Ash Dieback are more, or less sensitive to Emerald Ash borer.

DNA analysis is proving very useful in understanding the pathogen. European populations of *H. fraxineus* are genetically homogenous, representing a relatively narrow population of the pathogen, compared to others in Asia. This could be due to only some varieties (genotypes) of the pathogens being infective on European Ash, or it could reflect the relative geographical separation of the main pathogen population in east Asia compared to a small introduced population in Europe. The latter would be something to be wary of, as the tolerance so far observed in European Ash could be overcome by other more virulent genotypes of the *H. fraxineus* also being accidentally introduced here. This is another very good reason to maintain the Plant Health Order which prohibits all imports of ash seeds, plants and trees, and all internal movement of ash seeds, plants and trees. It is still not clear whether the fungus arrived by natural dispersal (birds, wind) or via imported materials, or both.

The other thing to note is that we are not talking about 'resistance' in the sense that these trees will eliminate the pathogen. Instead, there are genetic markers and metabolite profiles that are associated with enabling Ash trees to live with, and suppress growth of (rather than kill) the pathogen. I haven't been able to find any references to how exactly the more resistant trees respond once infected, but research is continuing apace. However, I wouldn't hold any sway with unproven methods such as garlic injection. Why is it that Garlic is deemed the panacea of all known and imagined (vampires) ills?!

So what is the future for our wonderful Ash dominated woodlands in the UK and specifically in Shropshire? Various reports have looked at the potential ecological impact (Mitchell, 2014) and concluded it could be severe, but the actual impact will depend on how susceptible and how variable the Ash genotypes are. A mass screening trial being carried out by Forest Research took seed from a range of provenances across Britain, the aim being to identify inherent tolerance in *Fraxinus excelsior*, but whether this included some from

Shropshire I haven't yet found out. British Wildlife recently ran an article on the likely increasing, and already important, ecological role of naturalised broadleaf trees in Britain (Alexander, 2016) such as Hornbeam (I always had this pegged as native?), Horse-Chestnut, Sycamore and Sweet Chestnut. Chalara has been confirmed in Ironbridge Gorge but the Severn Gorge Countryside Trust sought to reassure in that many of the woodlands they manage already have a range of tree species.

There is a wealth of other information relating to the legislation, the research and the management strategies for controlling the spread on the Forestry Commission website http://www.forestry.gov.uk/ashdieback

A handy and important resource is to use Tree Alert to report any cases of Ash Dieback, or other tree diseases for that matter: http://www.forestry.gov.uk/treealert

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Looking at stomata – a simple technique

Martin Grodfrey

Introduction

Stomata are almost ubiquitous in green plants, their unique combination of a pore surrounded by a pair of guard cells which can control the opening of the pore (Fig 1) facilitating the exchange of gasses and water vapour essential to life. Although plentiful on the leaves they are not distributed in the same way in all species – sometimes they are only on the bottom surface of the leaf, sometimes on the top and sometimes on both surfaces. The density on each leaf surface can vary between species too. Their distribution on leaves, and occasionally the size of the guard cells, is sometimes used in the identification of species and hybrids – the only problem being that they are so small that they can be difficult to see without a microscope. Traditional botany text books tell you to strip of pieces of the epidermis off the upper and lower surface of a leaf to examine under the microscope – which can be rather difficult in practice. The purpose of this article is to describe a very simple technique which will enable you to find the distribution of stomata on any leaves and, if necessary, to measure their density and the size of the guard cells.

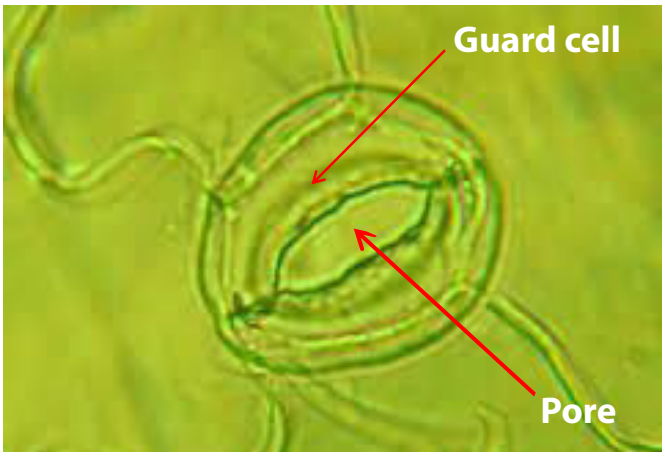


Fig 1. Stomata

Method

The method works by making a "cast" of the surface of the leaf using clear nail varnish. It works perfectly well with either fresh or pressed

herbarium specimens but I will illustrate it here with fresh *Viola* leaves.

Paint clear nail varnish in a patch about 1cm square on either side of the leaf (Fig 2), cheap supermarket nail varnish is fine.

Leave the patches to dry for at least 30 mins, if you leave it for too short a period the varnish will stretch when you try to remove it.

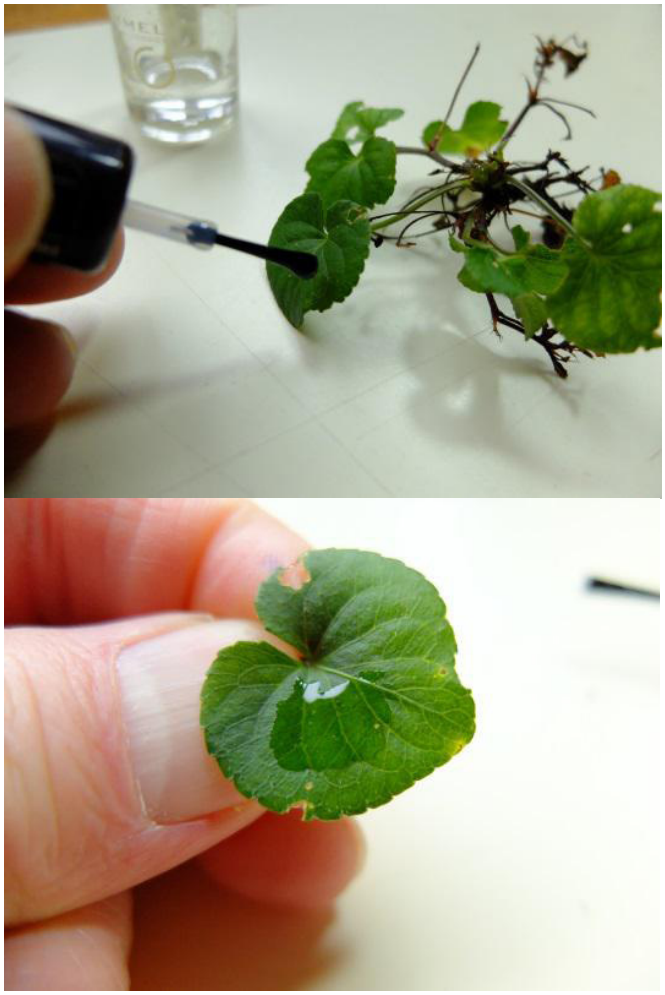


Fig 2. Nail varnish painted onto leaf

When dry strip the patches from your leaf with a pair of fine forceps, you may need to start the removal process by lifting the edge of the varnish with a sharp scalpel point, and mount them in a drop of water (with a little washing up liquid in to help wet the plastic film) on a slide and cover with a coverslip. You can then examine the slides under the microscope where you will see a cast of the surface of the leaf in the varnish - make sure that you know which surface in which (Fig 3 and 4).

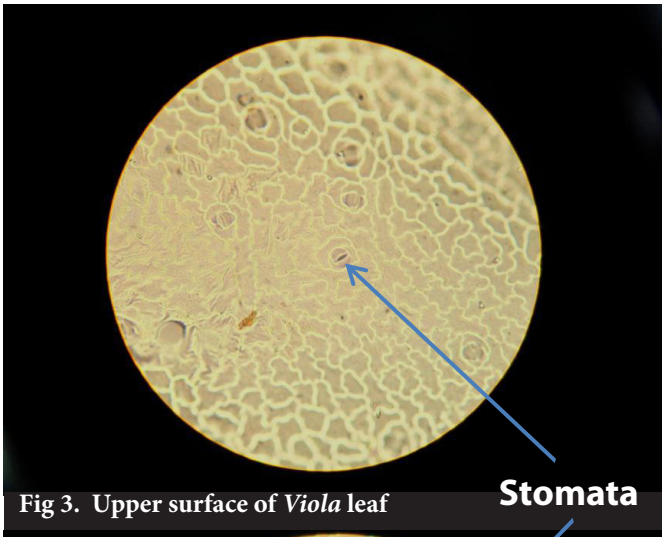


Fig 3. Upper surface of *Viola* leaf

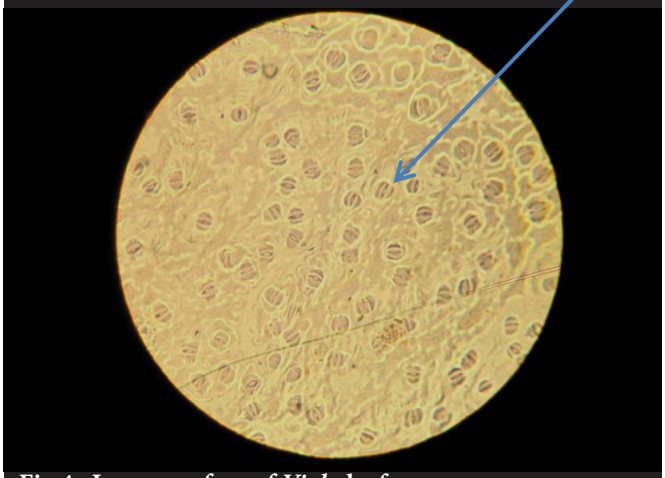


Fig 4. Lower surface of *Viola* leaf

You will see from the photos above that this plant has stomata on both leaf surfaces but they are denser on the lower surface than the upper.

Guard cell size

Unlike the rest of the cells in the leaf epidermis the size of the stomatal guard cells is remarkably uniform in length. However if your plant should be polyploid the length of the guard cells will increase with the ploidy level – which means that by measuring the guard cell length you can get an indication of increased ploidy without the need to make a chromosome preparation. Sadly you will probably need to do a chromosome count if you need to know the exact ploidy level.

Elegant Water-lily

"Least Water-lily indeed, a dwarf, why it's a dainty princess I am.

No blowsy big petals and straggly leaves for me. A petite yellow job am I.

I was one of the first dicots, before plants went all fancypants.

A basal angiosperm I'm called, there's posh.

Don't know who those young land orchids think they are, look like Barbie doll to me.

I am so Rare now I have two RRs in the books. I was widespread in the early Flandrian you know.

Today, I only grow in exceptionally clear waters in fine north Scottish lochs and secluded Colemere.

I only grow on the peaceful north shore away from those nasty modern things called boats.

I like lowlands and bays, but not too much shade and definitely no polluted water for me.

I once grew by Colemere boat house, but trees shaded me out.

Nice men from Shropshire Council are clearing those awful alien things,

Rhododendron they're called, away from me, to prevent too much shade.

I did have siblings in other local meres too, but shade and eutrophication did for them.

One of my ancestors at Betton Pool got too close to *Nuphar lutea*.

Produced *Nuphar x spenneriana*. What an awful name.

Aggrandizement maybe? I suppose some poor soul was called Spenner.

Oh the shame of it, wrong side of the blanket. *Pumila* must have been lonely.

Only the hybrid remains at Betton. Not PC to make jokes about Dutch hybrid vigour now.

I'll have you know that botanists even swim out just to look at me so rare am I.

AND I am a floral emblem, recorded in every good flower book, so take special care of me."

Nuphar pumila

Written by Ruth Dawes and previously printed in *Reflections* published by Shropshire Wildlife Trust.

New Records

Sarah Whild & Alex Lockton

The Botanical Society database currently stands at 557,354 records, including bryophytes (23,710 records) and charophytes (195) with the rest being vascular plants. In total some 2,395 species are covered, minimising as much as we can the number of vague taxa, aggregates and subspecies. All this data is freely available in simplified form on the SEDN web site (visit the access data page) or in full to members on request.

Current recording is steady, as would be expected when the Flora is finished and we have more than enough records for the next Atlas. We receive about 10-20,000 records each year, and so far we've input 3,500 for 2017. We are of course grateful to everyone who sends in data and we hope they also appreciate the value of the Society in compiling the database and making it widely available for use in research and conservation.

Some of the more interesting finds so far in 2017 are as follows:

- Kate Thorne collected a specimen of a rose at Rhos Fiddle in 1997 and grew it on in her garden in Pulverbatch. This year, during Kate's course on rose identification, Mark Kitchen observed that it appeared to be *Rosa villosa*, Apple Rose, which is a newly discovered species in Britain. Previously it had been identified as the closely-related *R. mollis*. The BSBI referee, Roger Maskew, has confirmed that it is indeed Apple Rose, and has visited Rhos Fiddle to see it (it grows along the lane to the west, from SO199852 to SO204857). This is only the second known site for it in Britain. Credit for this fabulous find should be shared between Kate, Mark and Roger. The first record for the county should be backdated to 1997, as the specimen was collected at that time. A conundrum is what to do with Joyce Warren's 1982 record of *R. mollis*, which was correct at the time, as far as anyone could have known, but should now perhaps be marked as incorrect.
- Another great find this year was a wall of a railway bridge covered with *Adiantum capillus-veneris*, Maidenhair Fern, at the station in Shifnal (SJ749076, 9th April 2017) by Steve O'Donnell. How this nationally scarce plant came to be overlooked for so long in the middle of a busy town is anyone's guess, but it adds a new species to the county list.

- Jonathan Shanklin has continued to add new plants during his visits to the county. The most interesting this year was *Viola x contempta* (*V. arvensis* x *tricolor*), which turned up at Buntingsdale (SJ6531), Colehurst (SJ6631) and Hunkington (SJ5613). It is worth looking out for: just like a field pansy but with a hint of purple in the petals. Jonathan also found *Alcea rosea*, Hollyhock, and *Euphorbia characias*, Mediterranean Spurge, in semi-wild situations. These are both common garden plants which presumably escape quite regularly but do not seem to spread.

Adiantum capillus-veneris at Shifnal

"Consider (ponder deeply) the lilies – how they grow"

The following contribution to a 1961 edition of *The Tanat Valley Review – A Monthly Magazine of News and Events in the Life of Llanyblodwel Churches* was kindly given to Gareth Egarr, SWT, who passed a copy onto Ruth Dawes.

Editorial II. – "Consider (ponder deeply) the lilies – how they grow"

OR

FELLOWSHIPS OF FLORA AROUND BLODWEL ROCKS

BY AN OLD COUNTRY WOMAN

In school days my interest in the flora around Blodwel Rocks was aroused by the unique specimens sent to our school by Mr. Nicholson of Porthywaen Quarries (globe flowers, bog asphodel, water avens, meadow saffron, Solomon's seal, sweet scented orchis, Star of Bethlehem (ornithogalum), rare cranes bills and mallows, etc.

Those who have grown up with the handsome fennel and valerians of the lime kilns, and all other lime-loving flowers around (viper's bugloss, comfrey, mulleins, black horehound, woody night shade, hound's tongue, several varieties of St. John's wort and senecios and gentians) do not perhaps realise what unique fellowships of flora grow in their district.

How many parishioners know what a variety, even, of trees, grow in the wet backwash near the Church? Let alone the treasures that grow beneath and among them? How very good it is to find that the teachers at Porthywaen School encourage their pupils to seek out, and enjoy the local treasures of hill and field! I can't get about as I used to do, and wonder if the children and young people would help to compile a record of plants growing here to-day? Not of course picking everything they discover, but learning to look at a growing plant in its own natural surroundings, and noticing where and what other plants grow with it.

For plants, like people, grow together in fellowships, and it is only by watching that we can learn why they grow together (trees and flowers, mosses, fungi and lichens, etc.)

The cutting down of the trees on 'the Rocks' has, for example, changed fellowships of flora which lived in their shade. Are there any herb paris left from the carpet of it, near the old horse-chestnut trees? Or tway-blade and other rare orchis? Delicious wild strawberries, creeping jenny, pimpernels, Lady's mantle, alkanet, butter-burs and brambles have come instead.

On the other hand, what was known as "the mushroom field' is now dominated by silver birch and their interesting fungi, together with harebells, salad burnets, agrimony, ploughman's spikenard, carline thistle, sheep's bit and a rare scabious in plenty.

Leeky tells of an old woman who was burnt for gathering soil from under silver birches for her garden. A more appalling lack of understanding, and so of knowledge, would be hard to find. The woman had perhaps watched and noticed how the soil in one place had a life it lacked in others; and had noted, too, the change that came from mixing differing soils together. In those days a little knowledge was a dangerous thing indeed! It was at least another 150 years and perhaps much longer, before the scientists of our day caught up with Wisdom such as this. Using the same technique, forests are now grown where it was only heath and waste before. But to those in power then, it was sheer 'witchcraft' and so not to be borne even for a day.

To return to our Rocks at Blodwel, in spite of the change from mature trees and rabbits, there are still many limestone plants holding their own about 'the Rocks'. Whitebeam, with its heavily scented flowers and red berries, spindle, columbines of various colours, tiny 'Michaelmas daisies', hellebores, golden rod, rock 'roses' (helianthemum), moschatel. The tiny yellow roses with stipuled leaves which grew near 'the gap' have gone from there. So has the rare yellow heart's ease. Do they still grow in the district? If you find them, please do not pick them nor the isolated specimens of bee and butterfly and other, nor rare orchids you may find.

Some of these fellowships of flora are our own peculiar heritage, not to be found elsewhere, and so Blodwel's special pride and joy. Let us think of them as God's gift to us, and remember the lines in which John Arlott expresses our thoughts so well:

"God, whose farm is all creation,

Take the gratitude we give."

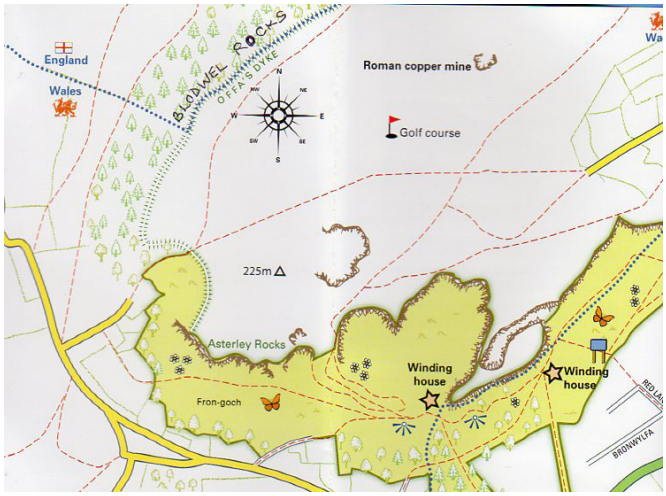
and if we will, add our own part thus:

"Take the finest of our harvest,

Crops we grow that men may live."

Ruth Dawes has pleasure in writing some positive feedback on this charming article.

It is reassuring to see that virtually all of these lovelies are still around Llynclys, Porthywaen, Dolgoch and Llanyblodwel. The 1961 writer has a fair grasp of plant ecology, although she does not



differentiate between native species and garden escapes, but the experts still argue about the status of archaeophytes and neophytes today. The *Polygonatum* hybrid, *Ornithogalum*, *Symphytum x uplandicum*, *Pentaglottis* and *Petasites hybridus* and *P. fragrans* all once belonged to local gardens, but now look very natural on roadside verges and in rocky grassland. *"Columbines of various colours"* are probably a relic of quarrymen's cottage gardens; the native one is usually blue. *"The handsome fennel and red valerian of the lime kilns"* are still there, as well as in the cottage gardens from whence they came.

The black horehound and woody nightshade are not lime-loving plants, but species of waste places and hedgerows, the latter often in damper places.

Narthecium ossifragum is a puzzle, being an acid wetland lover, but as it is quoted amongst the specimens that Mr Nicholson of Porthywaen Quarries brought into the school, he may well have brought it from elsewhere, as an attractive and interesting species for the children to see. Likewise, *Jasione montana* is a plant of dry, sandy, acidic places, but the late Doris Pugh did record it near the Welsh border, close to Pen-y-bont Llanerch Emrys.

The writer must be referring to Llanyblodwel church in the second paragraph, sited close to the River Tanat, which does indeed still have many trees and aquatic and emergent plants, not to mention carpets of naturalised snowdrops along the river bank, which makes the Llanyblodwel loop a popular walk in February.

I regard the location of **Blodwel Rock** SSSI (SJ2622) to be as it appears on the old green Pathfinder OS Maps, a limestone escarpment running roughly from Jacob 's ladder on the edge of Llynclys Common south west to the golf club at Llanymynech. *Hilda Murrell's Nature Diaries – 1961–1983*, published by Collins, also record interesting botanical findings here, including *Trollius*. The trees on the rocks are naturally getting taller and shadier, but open bays with calcareous lawns still exist and *Helianthemum nummularium* grow there with the uncommon *Scabiosa columbaria* and native *Solidago*. Can "*the tiny yellow roses with stipuled leaves which grew near the gap*" be *Rosa spinosissima* with its creamy

Primula veris

Colchicum autumnale Wigmore August 2017.

Helianthemum nummularium

flowers and many prickles and acicles? If so, it does grow in one known place on Blodwel Rock, although I admit I have never seen it flower in the dark corner that once was open. *"Tiny Michaelmas Daisies"* (probably *Erigeron acris*) are still around in the old limestone quarries too. I cannot see the white felted leaf backs of *"Whitebeam, with its heavily scented flowers and red berries"* (*Sorbus anglica*) as easily now, but they are still there, checked by agile expert botanists in 2011. It would be good to see these leaves waving in the wind again and once more have those wonderful views to the west with the tree tops a little lower, but this is a dangerous job for the private landowner. I do not remember *"the old horse chestnut trees"*, but I always enjoy the excuse to stop and admire abundant patches of *Paris quadrifolia* as I haul myself up The Drag or Gwalia Bank through dappled shade from Porthywaen onto the escarpment.

The wetland plants are still around too, *Trollius* at Blodwel Marsh and Sweeney Fen SSSIs, together with *Geum rivale* and *"sweet scented orchis"* (*Gynadenia densiflora*) at the latter site.

The *"hound's tongue "* has become extinct or moribund at its Llanymynech Rocks site; maybe a tad shaded out, but it still occurs along a green track in the Oswestry uplands at Cynynion. Was *"the rare yellow heart's ease" - Viola lutea*? Always a very rare plant in the Oswestry area, it has declined throughout its upland range in Shropshire.

Locally rare *Geranium pratense* does still grow on the verges around Llynclys and attractively with *Persicaria bistorta* in a traditional old damp hay meadow at Trefonen. Surprisingly, she does not mention the small traditional fields of *Primula veris*, which still exist around Llynclys, Llanymynech and Treflach. Were they always there?

Much of the credit for the continued presence of these species must go to Shropshire Wildlife Trust for taking on the complex management of the Oswestry group of nature reserves, not to mention the dedication of their volunteers in undertaking so much hard manual work on steep rocky terrain AND the difficult task of getting these sites suitably grazed. SWT have recently undertaken some clearance work around the bank of Offa's Dyke, previously much hidden on Llynclys Common, so who knows what delightful species may emerge

Senecio erucifolius, Butcher's Quarry, Llynclys. Jul 17.

Helleborus foetidus

there. *Melica nutans* was only discovered here in 1996 by Jackie Pedlow.

I believe that the *old country woman* would have been delighted to know that a team of local and national botanists would achieve her wish in 1985 when the ground breaking *Ecological Flora of the Shropshire Region* was published and made available to libraries and schools. I hope that I too, as another old countrywoman, have brought some *Comfort and Joy* that *All Things Bright and Beautiful* still remain in fellowship around Llynclys and Porthywaen. There are still mushroom fields around too, yum.